

Title: Bay Watch**Link to Outcomes:**

- **Problem Solving** Students will use various strategies to solve problems .
- **Communication** Students will communicate by writing a letter concerning an environmental problem.
- **Estimation** Students will use various strategies to calculate weight in grams .
- **Measurement** Students will select the appropriate unit of measurement and apply to interdisciplinary and real world problem solving situations .
- **Number Sense & Numeration** Students will represent numerical relationships on a chart.
- **Processes of Science** Students will organize, interpret, and communicate scientific information.
- **Applications of Science** Students will describe a local environmental problem.

Brief Overview:

This activity is an integrated math, science, and language art activity. Students will take an environmental approach to applying mathematics by first estimating and then weighing softshell crabs. Students will then brainstorm environmental factors that affect the life cycle of crabs, then write an explanatory paragraph supporting bay and wildlife preservation.

Grade/Level:

Grades 3-5

Duration/Length:

This lesson will take approximately five 45-minute class periods .

Prerequisite Knowledge:

- Ability in estimating weights of objects in metric measurement
- Experience in computing ratio and percent
- Students will use a calculator to compute the average error.

Objectives:

In this unit the student will:

- construct a physical model of a crustacean
- estimate and measure mass
- compute ratio and percent
- compute averages and error of averages on a calculator
- describe a local environmental problem

Materials/Resources/Printed Materials:

- *The Day They Left the Bay* by Mick Blackistone, OR
- *Chadwick the Crab* by Priscilla Cummings
- Material for construction of crustaceans (i.e. yarn, paper rolls, beads, glue, etc.)
- ½ dozen uncooked softshell crabs per group
- Balance scales (1 per group of 4)
- Gram stackers (1 set per group of 4)
- Paper towels
- Baby wipes (for clean up)
- Student worksheet (graphs)
- Calculators
- Video, *Watershed for the Chesapeake* by Maryland Sea Grant
- Writing prompt
- Graphic organizer
- Weekly Reader World Ocean Kit

Development/Procedures:

Day 1:

- Listen to a story about environmental effects on the Chesapeake Bay and construct a physical model of a crustacean.
- Complete KWL chart on the Chesapeake Bay
- Read aloud *The Day They Left the Bay* or *Chadwick the Crab*.
- Select a crustacean from the story and create a physical model of it using provided materials.

Day 2:

Activity 1:

- Distribute copies of the “Balancing Crab Act “ chart. (Attached)
- Use softshell crabs to estimate and measure mass. Arrange crabs from heaviest to lightest without using scales and record the guesses.
- Estimate mass of each crab in grams and record on the chart.
- Weigh each crab in grams and record weight on the chart.
- Find the difference between the estimated mass and actual mass.
- Find the ratio by dividing the difference with the actual; convert this to a decimal.
- Compute the percent of error.

Activity 2:

- Use graphic organizer to list environmental factors that would affect the life cycle of a crab.

Day 3:

- Watch video “Watershed for the Chesapeake Bay.”
- Draw a poster depicting an environmental pollutant and its effect on the Chesapeake Bay.

Day 4:

- The pupils will use their graphic organizers from Day Two activity 2 to list the importance of the Chesapeake Bay to the citizens of Maryland and surrounding states.
- Students will write an explanatory letter to the Governor or other legislator highlighting information from the video concerning the importance of preserving the Chesapeake Bay and its wildlife.

Evaluation:

- Monitor student interaction during construction of models.
- Check validity of data on crab weight measurements.
- Writing activity--check for adherence to writing standards including form, audience, topic, and purpose. Also, fluently communicate scientific information describing environmental concerns.

Extension/Follow Up:

- Field Trips: National Aquarium in Baltimore; the Horne Point facility in Cambridge.
- The class could visit local marsh for a group clean up.
- Have student use data on chart and construct a graph.
- Write a story about the model crustacean they constructed.
- Have someone from the Department of Natural Resources or the Chesapeake Foundation speak to the students.

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The Balancing Crab Act

CRABS	Estimated Weight (grams)	Actual Weight (grams)	Error (Difference)	Ratio (<u>Diff.</u> Actual) written as a fraction	Decimal (Diff. divided by actual) in decimal form	Percent (Decimal times 100)
#1						
#2						
#3						
#4						
#5						
#6						

Bonus:

1. What is the average weight of the crabs you weighed?
2. What is the average error in your estimates ?
3. Who had the lowest average of errors?